



**NEW ENGLAND  
COMMON ASSESSMENT PROGRAM**

**Released Items  
2009**

**Grade 11  
Mathematics**

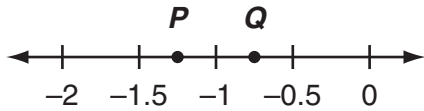
# Mathematics



Items with this symbol were selected from Session One—no calculators or other mathematics tools allowed.



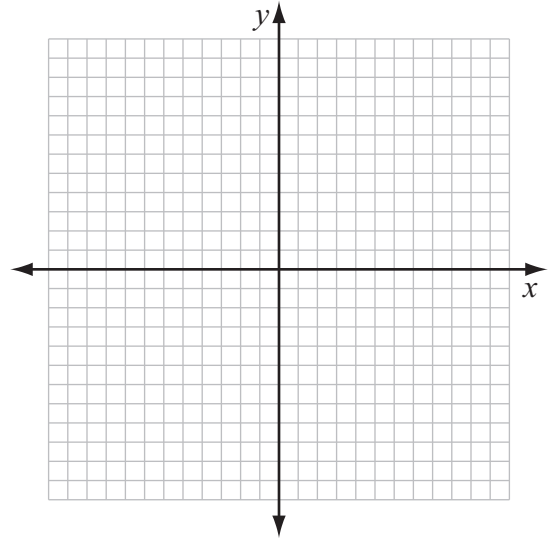
- 1 Look at this number line.



Between which two consecutive integers is the value of  $\frac{Q}{P}$ ?

- A. -2 and -1
- B. -1 and 0
- C. 0 and 1
- D. 1 and 2

- 2 You may use this blank grid to help you answer this question.



This list shows the coordinates of  $\triangle RST$  and its image  $\triangle R'S'T'$ .

- $R (-4, 6)$ ,  $S (-4, 9)$ ,  $T (-9, 6)$
- $R' (2, 6)$ ,  $S' (2, 9)$ ,  $T' (7, 6)$

Which transformation maps  $\triangle RST$  to  $\triangle R'S'T'$ ?

- A. a reflection over the line  $x = -1$
- B. a reflection over the line  $y = -1$
- C. a  $90^\circ$  clockwise rotation about the origin
- D. a  $180^\circ$  clockwise rotation about the origin

- 3 Courtney walks three laps around a  $\frac{1}{4}$ -mile track. How many feet does she walk?

[1 mi = 5280 ft]

- A. 440 ft
- B. 1320 ft
- C. 3960 ft
- D. 7040 ft

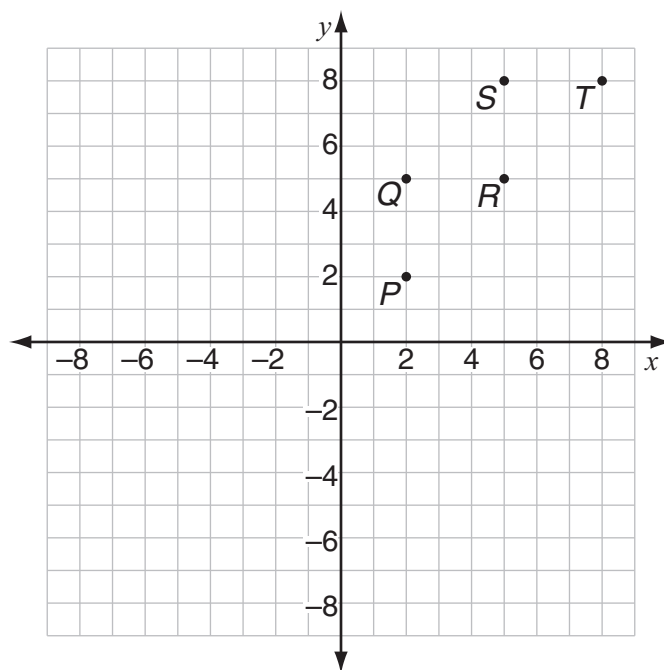
- 4 Andrea draws  $\overline{PQ}$  with endpoints  $P(4, -3)$  and  $Q(2, 6)$ . She then draws  $\overline{PR}$  so that it is perpendicular to  $\overline{PQ}$ . What is the slope of  $\overline{PR}$ ?

- A.  $-\frac{9}{2}$
- B.  $-\frac{2}{9}$
- C.  $\frac{2}{9}$
- D.  $\frac{9}{2}$

- 5 The diameter of circle  $P$  is  $\overline{RT}$ . The center of the circle,  $P$ , has coordinates  $(-4, 1)$ . The coordinates of point  $R$  are  $(2, -3)$ . What are the coordinates of point  $T$ ?

- A.  $(-12, 8)$
- B.  $(-10, 5)$
- C.  $(-6, 4)$
- D.  $(-1, -1)$

- 6 Look at this graph of a relation.



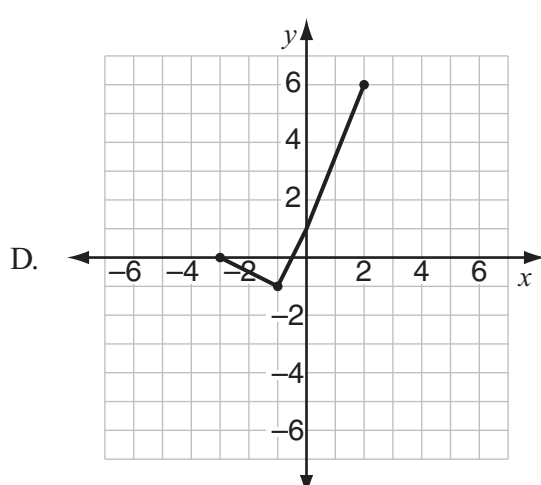
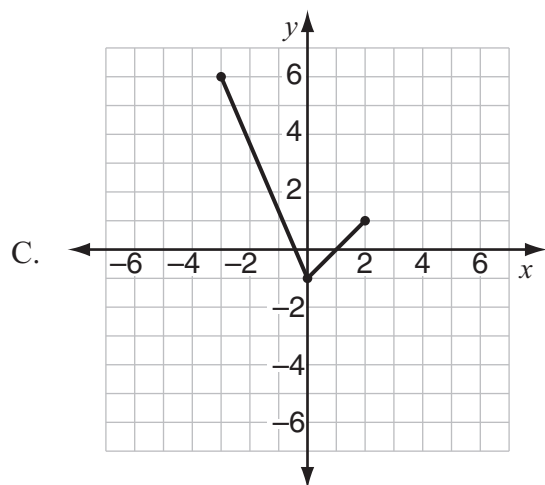
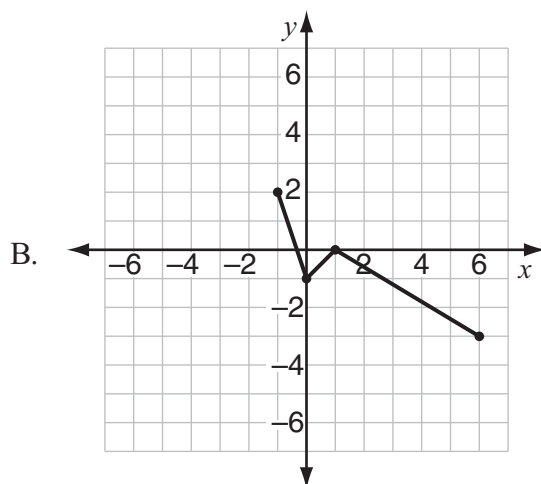
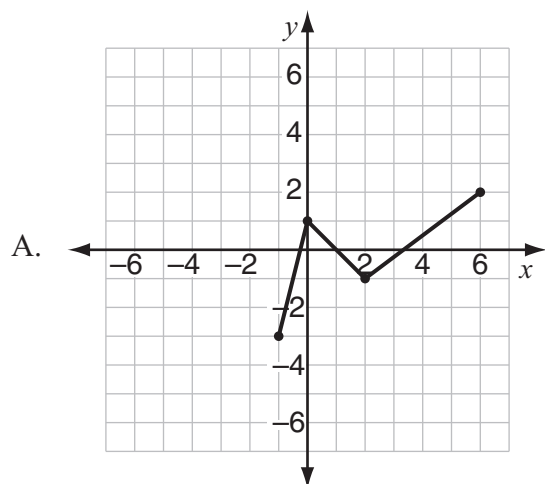
Which two points could be removed to make this relation a function?

- A. points  $P$  and  $Q$
- B. points  $Q$  and  $R$
- C. points  $Q$  and  $T$
- D. points  $R$  and  $S$

7 Bert graphs a function.

- The domain of the function is  $-3 \leq x \leq 2$ .
- The range of the function is  $-1 \leq y \leq 6$ .
- The  $y$ -intercept of the function is 1.

Which graph could represent Bert's function?



- 8 Which expression is equivalent to  $2x(x^2 + 9) - 2x$ ?

A.  $x^2 + 9$   
B.  $2x^3 + 16x$   
C.  $3x^2 - 2x + 9$   
D.  $2x^3 - 2x + 9$

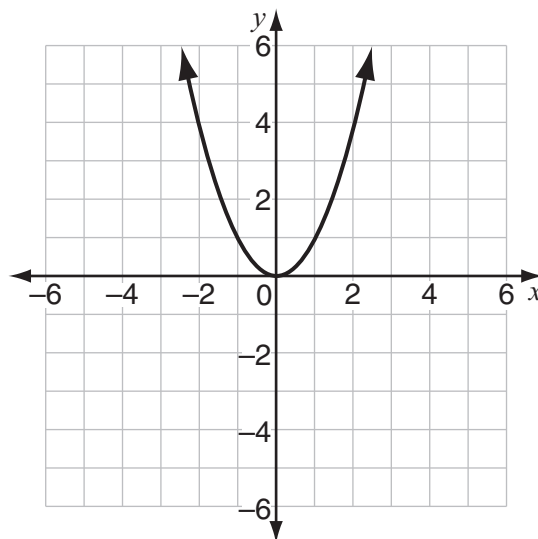


- 9 If  $x$  is an integer, which expression must be divisible by 3?

A.  $3x + 1$   
B.  $4x - 1$   
C.  $8x + 6$   
D.  $12x - 9$



- 10 Look at this graph of  $y = x^2$ .



If  $y = x - 2$  is graphed on the same coordinate plane, at how many points would the two graphs intersect?

A. 0  
B. 1  
C. 2  
D. 3

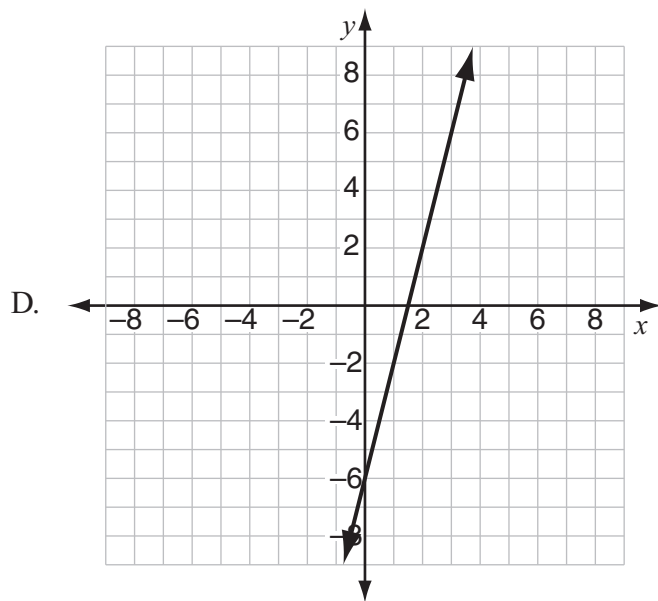
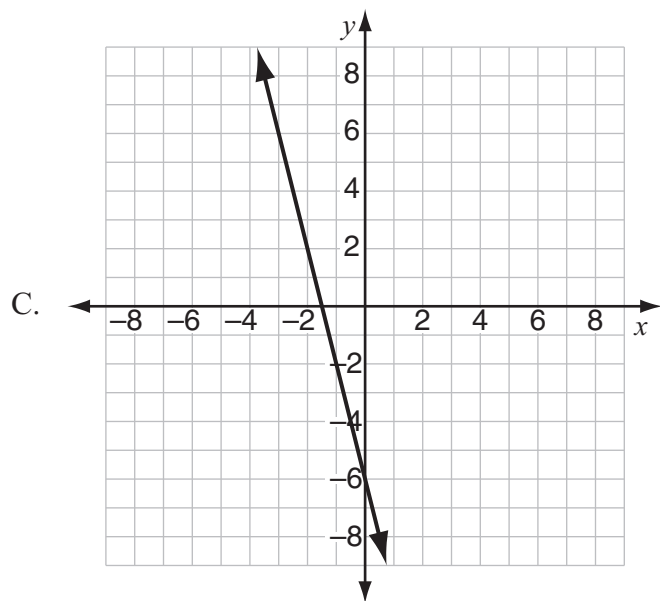
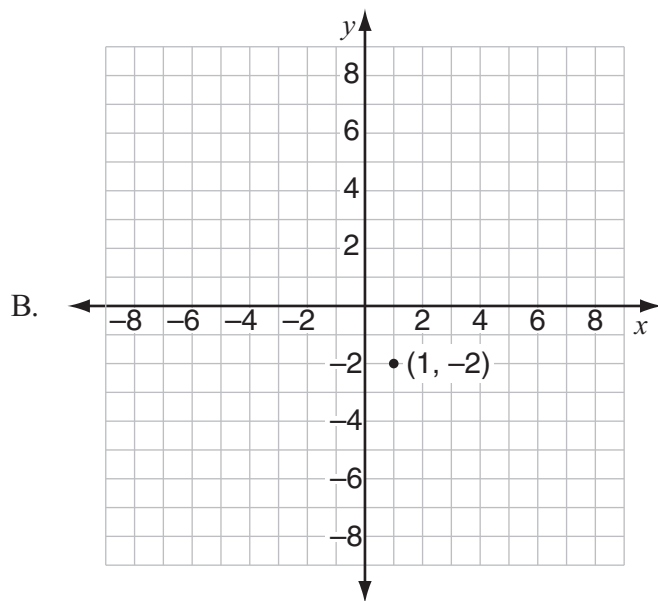
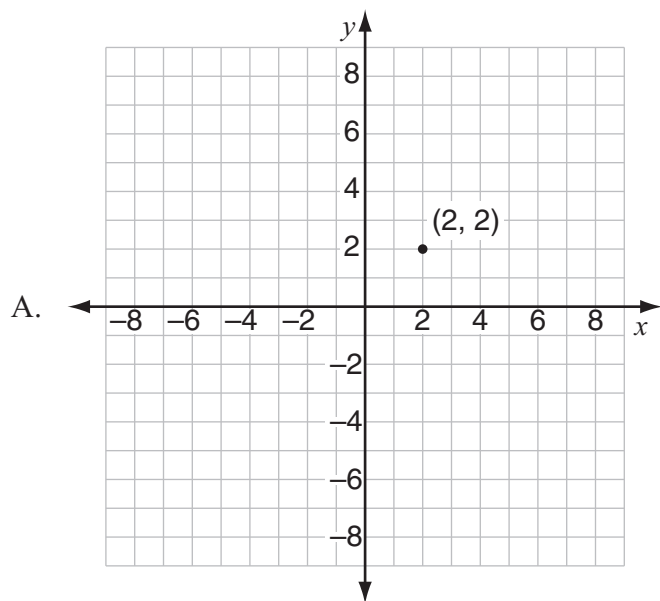


- 11 Look at this system of equations.

$$2y + 12 = 8x$$

$$12x - 3y = 18$$

Which graph shows the solution set of the system of equations?



- 12 Luigi will roll two cubes with faces numbered 1 through 6.

- Each face of each cube has one number on it.
- No number repeats on a cube.

Luigi records the product of the numbers that land face up. What is the probability that the product of the two numbers will be an odd number **less than** 20?

- A.  $\frac{2}{9}$
- B.  $\frac{1}{4}$
- C.  $\frac{1}{2}$
- D.  $\frac{8}{9}$

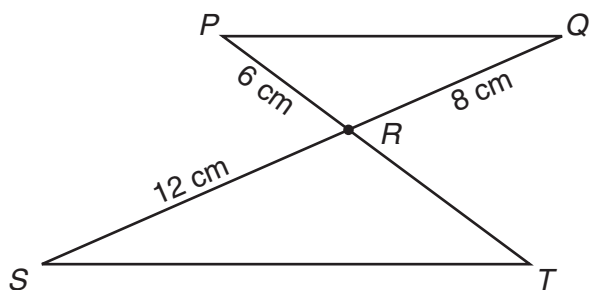


- 13 This list shows the values of  $x$ ,  $y$ , and  $z$ .

- $x = 4.03 \cdot 10^{-9}$
- $y = 5.12 \cdot 10^{-8}$
- $z = xy$

Write an inequality that orders  $x$ ,  $y$ , and  $z$  from **least to greatest**.

- 14 Look at this diagram.



In this diagram,  $\overline{PQ}$  is parallel to  $\overline{ST}$ . What is the length, in centimeters, of  $\overline{RT}$ ?



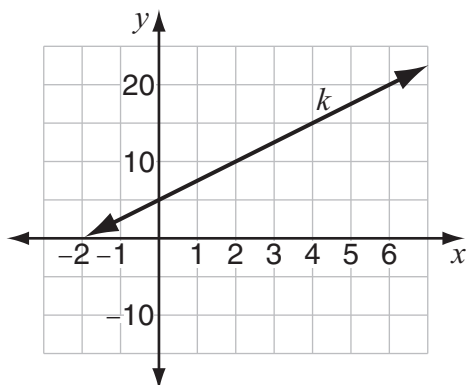
- 15 A pattern of triangles is shown below.

Step 1	Step 2	Step 3	Step 4
3 line segments	5 line segments	7 line segments	9 line segments

If this pattern continues, how many line segments will be in Step  $k$ ? Write your answer in terms of  $k$ .



- 16 Look at this graph.



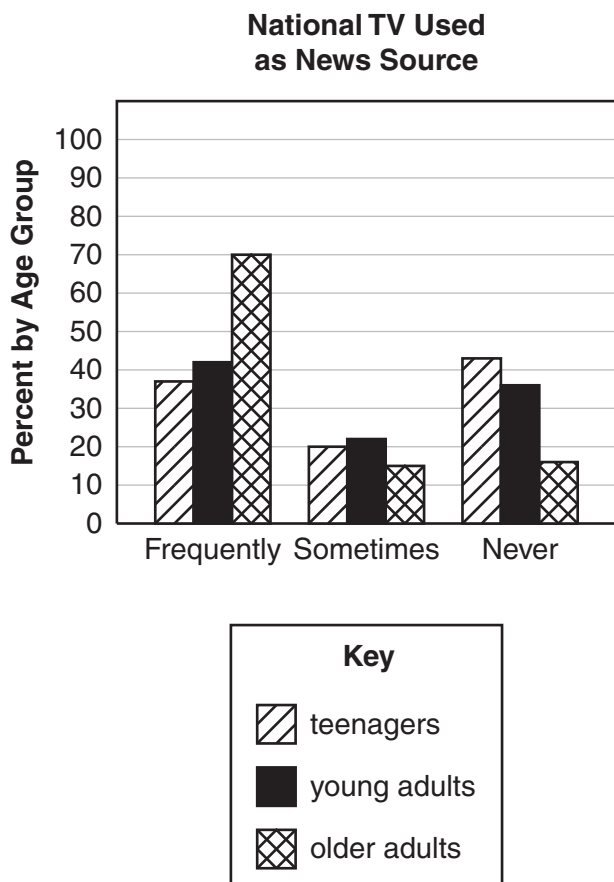
What is the slope of line  $k$ ?

- 17 This parabola shows the relationship between the amount of money a baker earns from bread sales each day and the price the baker charges for each loaf of bread.



Based on the parabola, what price should the baker charge for each loaf of bread to earn the greatest amount of money from bread sales each day?

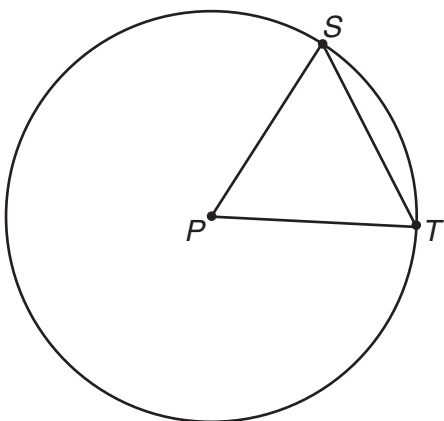
- 18 This graph shows the results of a study about how much people of different ages use national TV as a source of news.



What percent of the teenagers surveyed make **at least** some use of national TV for news?

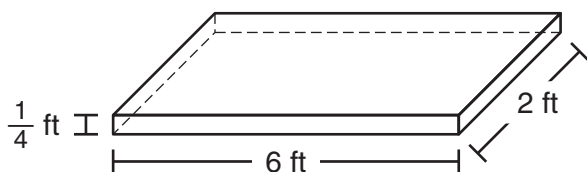


- 19 Look at this diagram.



The center of the circle is point  $P$ . The measure of  $\angle SPT$  is  $60^\circ$ . Use geometric reasoning to explain why  $\overline{ST}$  is congruent to  $\overline{PT}$ .

- 20 A board foot is a piece of wood 1 foot wide, 1 foot long, and 1 **inch** thick. A lumberyard sells the pine board shown below for a price of \$3.40 per board foot.



What is the total cost, in dollars, of the pine board? Show your work or explain how you know.



- 21 Coach Murphy records the weight of each person who tries out for the football team and the number of push-ups each person completes in one minute. This table shows the data.

Weight (in lb)	Number of Push-ups	Weight (in lb)	Number of Push-ups
221	27	143	18
175	25	150	21
180	36	153	12
202	19	165	30
173	37	171	14
184	33	188	20
199	22	207	16
209	20	210	35
159	31	225	18
232	26	236	12
280	30	187	39

Coach Murphy wants to display these data using a bar graph, a line graph, or a scatter plot. Use mathematical reasoning to explain which of these data displays is most appropriate for Coach Murphy to use.

- 22 A coach will order baseball caps from one of two companies.
- Creative Caps charges a one-time fee of \$50, plus \$5 per baseball cap.
  - Happy Hats charges a one-time fee of \$30, plus \$6 per baseball cap.
- a. How much does Creative Caps charge for an order of 15 baseball caps?
- b. Write an algebraic expression to represent the amount that Creative Caps charges for an order of  $x$  baseball caps.
- c. The coach wants to buy baseball caps from the least expensive company. In terms of the number of baseball caps, when should the coach order the baseball caps from Creative Caps? Show your work or explain how you know.



- 23 Greg wants to buy a computer chess game with a regular price of \$40. A hobby shop sells the computer chess game at a discounted price of 30% off the regular price.

a. What is the discounted price, in dollars, of the computer chess game at the hobby shop?

A department store sells the same computer chess game at a discounted price of 20% off the regular price of \$40. On Saturday, the department store will take an additional 10% off the already discounted price of this computer chess game.

b. Explain whether it is less expensive for Greg to buy the computer chess game at the hobby shop or at the department store on Saturday.

On Saturday, Greg buys a computer baseball game at the department store. The department store sells the computer baseball game at a discounted price of 20% off the regular price. The store takes an additional 10% off the already discounted price. After both discounts, Greg pays \$18 for the game.

c. What is the regular price of the computer baseball game? Show your work or explain how you know.